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First records of *Meggoleus*, *Heterocola* and *Phradis* (Hymenoptera: Ichneumonidae: Tersilochinae) from the Afrotropical region, with description of four new species

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ABSTRACT

The genera *Meggoleus* Townes, *Heterocola* Förster and *Phradis* Förster are recorded from the Afrotropical region for the first time. Four new species are described: *Meggoleus townesi* sp. n., *Heterocola africana* sp. n., *Phradis modestus* sp. n. and *P. wolfgator* sp. n. A key to the nine Afrotropical genera including *Allophrys* Förster, *Aneuclis* Förster, *Diaparsis* Förster, *Probles* Förster, *Sathropterus* Förster, and *Tersilochus* Holmgren is provided.

KEY WORDS: Hymenoptera, Ichneumonidae, Tersilochinae, *Meggoleus*, *Heterocola*, *Phradis*, new species, identification keys, Afrotropical region, Africa.

INTRODUCTION

Tersilochinae is a cosmopolitan ichneumonid subfamily that is most species-rich in the Holarctic region (Yu *et al*. 2005). The Afrotropical fauna of Tersilochinae is poorly known and includes only three described species (Townes & Townes 1973): the cosmopolitan *Sathropterus pumilus* (Holmgren, 1860) and *Diaparsis evanescens* (Morley, 1912) from the Seychelles, and the South African *D. moesta* (Holmgren, 1868).

In this paper, the genera *Meggoleus*, *Heterocola* and *Phradis* are recorded from the Afrotropical region for the first time. Four new Afrotropical species are described: *Meggoleus townesi* sp. n., *Heterocola africana* sp. n., *Phradis modestus* sp. n. and *P. wolfgator* sp. n. A key to the nine known Afrotropical genera—*Allophrys*, *Aneuclis*, *Diaparsis*, *Heterocola*, *Meggoleus*, *Phradis*, *Probles*, *Sathropterus* and *Tersilochus*—is also included. No Afrotropical species of the genera *Allophrys*, *Aneuclis*, *Probles*, *Sathropterus* and *Tersilochus* have been described so far.

MATERIAL AND METHODS

This work is based on the material housed in the Iziko South African Museum, Cape Town. Terminology for morphological structures mainly follows Townes (1969). Types of the new species are deposited in the Iziko South African Museum (SAMC) and the Zoological Institute of the Russian Academy of Sciences, St Petersburg (ZISP).

TAXONOMY

Key to Afrotropical genera of Tersilochinae

1 First metasomal segment with glymma joined by a furrow to ventral part of postpetiole (Fig. 1) 2
– First metasomal segment without glymma (Fig. 2), or with isolated glymma .... (Fig. 3) 3
2 Thyridia much longer than wide. Sternaulus distinct, almost as long as mesopleuron .... **Probles** Förster

– Thyridia short, at the most as long as wide. Sternaulus of varying length, or absent .... **Tersilochus** Holmgren

3 Propodeal spiracle large (Fig. 4). Propodeum with basal keel (sometimes indistinct) (Fig. 4). Second recurrent vein postfurcal (as in Fig. 6) .... **Meggoleus** Townes

– Propodeal spiracle not enlarged (Fig. 5). Propodeum with basal keel, furrow or area (Fig. 5). Second recurrent vein postfurcal, interstitial or antefurcal 4

4 Propodeum with wide basal furrow or area (Fig. 5). Second recurrent vein interstitial (Fig. 20) or antefurcal (Fig. 19). First metasomal segment without distinct glymma (as in Fig. 2) 5

– Propodeum with basal keel (as in Fig. 4). Second recurrent vein postfurcal or rarely interstitial. First metasomal segment without glymma, or sometimes with distinct glymma (Fig. 3) 7

5 Maxillary palpus much longer than height of head (Fig. 8). Second recurrent vein antefurcal (Fig. 19) .... **Heterocola** Förster

– Maxillary palpus at the most half as long as height of head. Second recurrent vein interstitial (Fig. 20) or antefurcal 6

6 Nervellus of hindwing strongly reclivous (Fig. 11). Inner margins of eyes of male strongly convergent dorsally (Fig. 9) .... **Allophrys** Förster

– Nervellus of hindwing vertical or moderately reclivous (Fig. 10). Inner margins of eyes of male parallel .... **Phradis** Förster

7 Brachial cell of forewing closed at apex, posterior part of postnervulus present except for a narrow bulla (as in Figs 19, 20) .... **Diaparsis** Förster

– Brachial cell of forewing widely open at apex, posterior part of postnervulus absent (Figs 6, 7) 8

8 Second recurrent vein present (Fig. 6). Ovipositor upcurved, its tip not sinuate ... . **Aneuclis** Förster

– Second recurrent vein completely absent (Fig. 7). Ovipositor tip sinuate .... **Sathropterus** Förster

Genus *Meggoleus* Townes, 1971

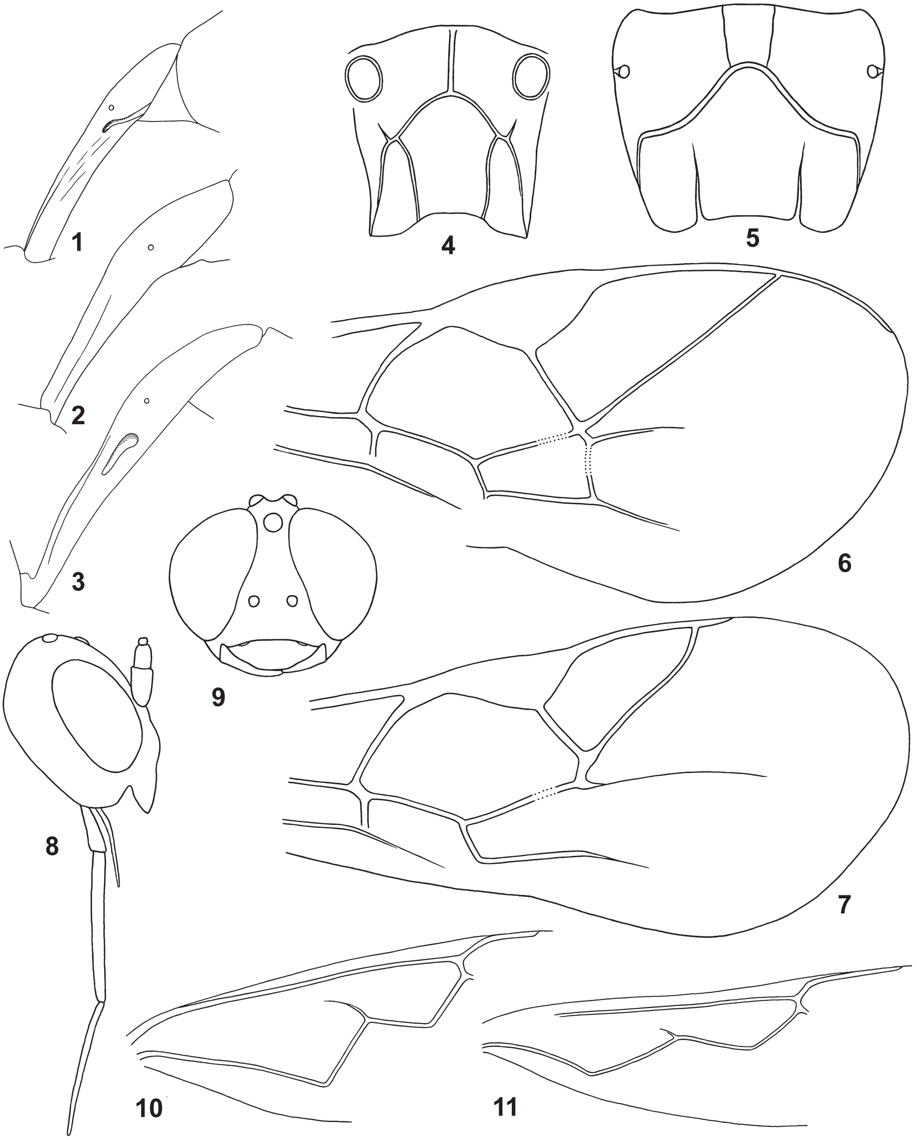
This is a small genus that before now included only one Brazilian species, *M. spirator* (Townes 1971). The genus is characterised by the exceptionally large propodeal spiracle (Fig. 4), a character unknown in other ichneumonids. A further species of this genus is described below from Gabon.

Meggoleus townesi sp. n.

Figs 4, 12, 15, 23

Etymology: Named in honour of the famous American entomologist and taxonomic ichneumonid expert, Dr Henri Townes.

Diagnosis: The new species differs from the South American *M. spirator* in that the prepectal carina reaches the anterior margin of the mesopleuron near its midlength (in *M. spirator* the prepectal carina reaches dorsally almost to subtegular ridge), the spiracle of the first tergite is not enlarged, and the first tergite is without a glymma and round in transverse section.



Figs 1–11. Afrotropical Tersilochinae: (1) *Tersilochus* sp., first tergite, lateral view; (2, 3) *Diaparsis* spp., first tergites, lateral view; (4) *Meggoleus townesi* sp. n., propodeum, dorso-posterior view; (5, 10) *Phradis wolfgator* sp. n.: (5) propodeum, dorso-posterior view, (10) venation of hindwing; (6) *Aneuclis* sp., forewing; (7) *Sathropterus pumilus*, forewing; (8) *Heterocola africana* sp. n., head, lateral view; (9, 11) *Allophrys* spp.: (9) head, anterior view, (11) venation of hindwing.

Description:

Female.

Body length 3.2 mm.

Head 0.68 mm wide, narrowed behind eyes in dorsal view; temple short, almost 0.7 times as long as eye width (Fig. 12). Ocelli rather large (Fig. 12). Antenna filiform, short; flagellum with 14 or 15 segments (Fig. 15); flagellomeres, excepting first and apical ones, distinctly transverse; all flagellomeres with long bristles. Mandible very slightly narrowed, punctate basally, upper tooth much longer than lower tooth. Malar space somewhat shorter than basal width of mandible. Clypeus broad, usually smooth on lower part, and granulate and densely punctate on upper part. Face, frons and vertex finely granulate and usually finely punctate (punctures sometimes indistinct because of granulation). Temple smooth or almost smooth, very finely and sparsely punctate. Occipital carina obliterated dorsally.

Mesonotum entirely granulate, indistinctly punctate. Notaulus weak. Mesopleuron predominantly granulate, almost smooth and punctate in the middle. Prepectal carina reaching anterior margin of mesopleuron near its middle. Sternaulus in anterior part of mesopleuron, short, oblique, with some transverse wrinkles. Propodeum entirely granulate, with dorsolateral areas usually finely punctate; basal keel sometimes indistinct, 0.55–0.65 times as long as apical area; spiracle round and large (Fig. 4), separated from pleural carina; apical area elongate, rounded anteriorly, with pair of weak longitudinal carinae reaching transverse carina anteriorly.

Forewing length 2.2 mm. Pterostigma very wide. Metacarp not reaching apex of forewing. Second recurrent vein postfurcal, unpigmented anteriorly. Nervellus of hindwing strongly reclivous.

Hind femur length 0.53 mm, maximum width 0.15 mm. Hind tibia length 0.6 mm. Spurs of hind tibia weakly curved. Tarsal claws long, not pectinate.

First tergite length 0.6 mm, posterior width 0.2 mm; tergite slender, entirely smooth, round in transverse section, without glymma; spiracle situated distinctly behind the middle, not enlarged. Second tergite length 0.3 mm. Thyridia distinctly elongate, about 1.5 times as long as wide. Ovipositor short, upcurved, with shallow dorsal depression near apex, without teeth (Fig. 23); sheath 0.54 mm, almost as long as first tergite.

Body predominantly black, sometimes partly with brownish tinge. Palpi, mandibles (except darkened teeth), lower third of clypeus, tegula and legs (hind coxa and hind femur except for apex brown) yellow to yellow brown. Scape and pedicel of antenna usually yellowish, flagellum darkened. Pterostigma dark brown. Metasoma behind first segment brown to dark brown.

Male.

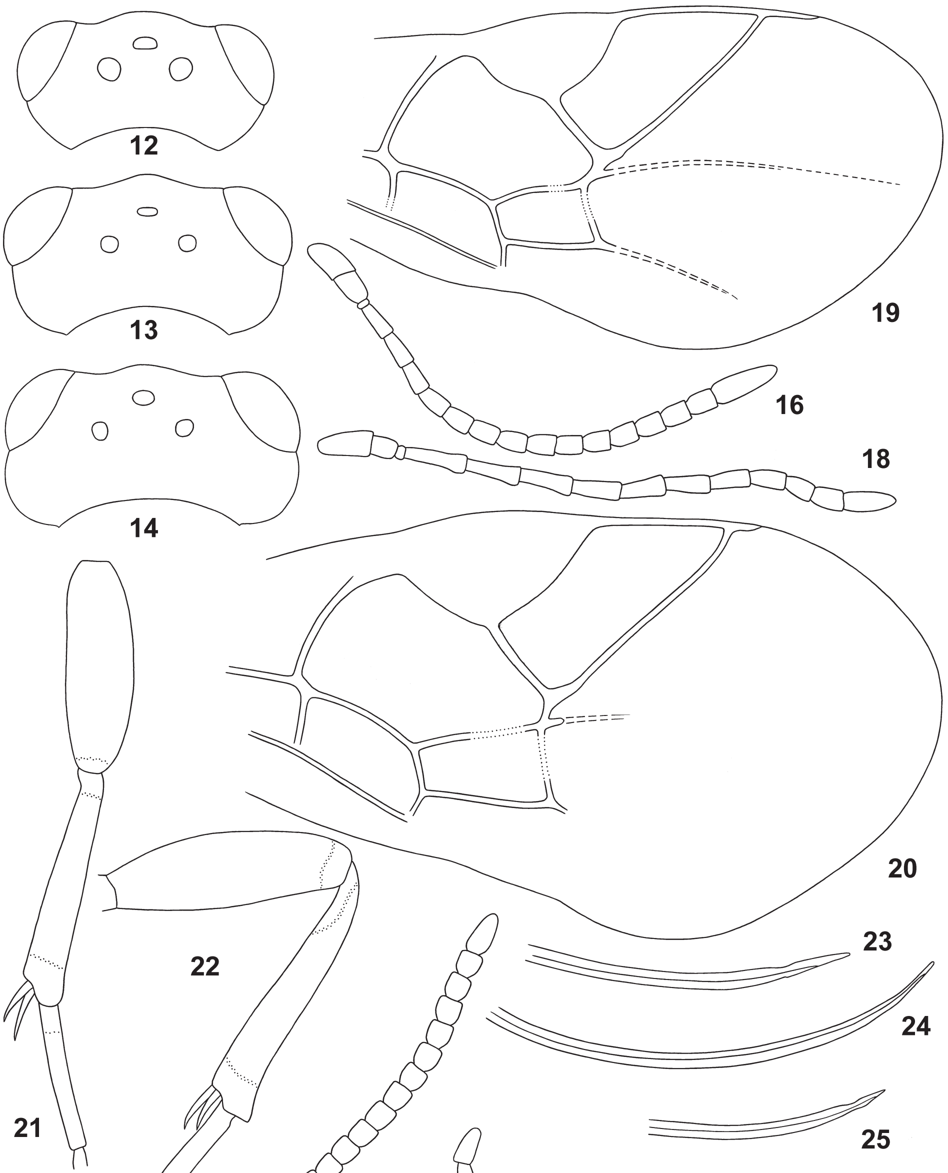
Basal and mid flagellomeres distinctly elongate, tips of antennae lacking. Propodeal spiracle not enlarged.

Holotype: ♀ 'GABON, Prov. Ogoové-Maritime, Réserve des Monts Doudou, 24.3 km 307° NW Doussala, 2°13.35'S:10°24.35'E, 370 m', '7.iii.2000, S. van Noort, Sweep, GA00-S43, Coastal Lowland Rainforest, undergrowth, low canopy in forest', 'SAM-HYM-P0024911' (SAMC).

Paratypes: GABON: *Ogoové-Maritime Prov.*: ♂ same data as holotype (SAMC); ♀ Monts Doudou Reserve, 25.2 km 304° NW Doussala, 2°13.63'S:10°23.67'E, 600 m, coastal lowland rainforest, along stream, Malaise trap, 18–19.iii.2000, S. van Noort (SAMC); 3♀ Moukalaba-Dougoua Reserve, 12.2 km 305° NW Doussala, 2°17.00'S:10°29.83'E, 110 m, coastal lowland rainforest, Malaise trap and sweep, 25–26.ii, 18–19.iii.2000, S. van Noort (1♀ SAMC, 2♀ ZISP).

Genus *Heterocola* Förster, 1869

Small genus with seven Palaearctic and probably one Oriental species; most species occur in southern Europe. The most noticeable character of this genus is the very long maxillary palpi (Fig. 8). The first Afrotropical species is described here.



Figs 12–25. New South African Tersilochinae: (12, 15, 23) *Meggoleus townesi* sp. n.: (12) head, dorsal view, (15) antenna, lateral view, (23) ovipositor, lateral view; (13, 16, 19, 21, 24) *Heterocola africana* sp. n.: (13) head, dorsal view, (16) antenna, lateral view, (19) forewing, (21) hind femur, tibia and basitarsus, (24) ovipositor, lateral view; (17, 25) *Phradis modestus* sp. n.: (17) antenna, lateral view, (25) ovipositor, lateral view; (14, 18, 20, 22) *Phradis wolfgator* sp. n.: (14) head, dorsal view, (18) antenna, lateral view, (20) forewing, (22) hind femur, tibia and basitarsus. Scale bar = 0.4 mm.

Heterocola africana sp. n.

Figs 8, 13, 16, 19, 21, 24

Etymology: From Africa.

Diagnosis: *H. africana* sp. n. differs from all European species in having a smooth mesonotum, the mesosoma very densely and coarsely punctate (smooth between punctures), the sternaulus distinct, the propodeal spiracle close to the pleural carina, and the metacarp of the forewing very short. The new species is further characterised by having the hind tibia almost as long as the hind femur, the apical carina of the propodeum distinct medially, the propodeum with a narrow basal furrow, and the first metasomal segment distinctly striate laterally.

Description:

Female.

Body length 3.0 mm.
Head about 0.7 mm wide, roundly narrowed behind eyes in dorsal view; temple somewhat shorter than eye width (Fig. 13). Ocelli small. Antenna filiform; flagellum with 15 segments (Fig. 16); all flagellomeres elongate. Maxillary palpus 4-segmented, extremely long, over 1.5 times as long as height of head (Fig. 8). Labial palpus 3-segmented, short. Mandible punctate basally, with upper tooth longer than lower tooth. Malar space half as long as basal width of mandible. Clypeus smooth, distinctly punctate on upper part. Face smooth medially, finely granulate and finely punctate laterally. Frons finely granulate, with fine and sparse punctation. Vertex finely granulate medially to almost smooth laterally, finely and sparsely punctate (punctures sometimes indistinct because of granulation). Temple almost entirely smooth, partly indistinctly punctate. Occipital carina complete.

Mesonotum very sparsely and finely punctate, almost entirely smooth (very finely granulate anteriorly). Mesopleuron coarsely and densely punctate (distance between punctures shorter than diameter of puncture), partly punctato-rugulose, smooth between punctures. Sternaulus situated in anterior part of mesopleuron, about half as long as mesopleuron. Dorsolateral area of propodeum rugulose laterally and mainly smooth dorsally; basal furrow narrow, about half as long as apical area; spiracle round, separated from pleural carina by 1.5 diameters of spiracle; apical area wide, with pair of longitudinal carinae (weak near transverse carina and distinct posteriorly).

Forewing length 2.26 mm. Pterostigma distinctly wider than length of first section of radial vein. Metacarp very short, ending far short of forewing apex (Fig. 19). Second recurrent vein antefurcal, unpigmented anteriorly.

Hind femur length 0.55 mm, maximum width 0.16 mm. Hind tibia length 0.6 mm, slightly longer than hind femur (Fig. 21).

First tergite length 0.57 mm, posterior width 0.22 mm. First tergite smooth dorsally (indistinctly striate medially) and distinctly striate laterally, round in transverse section. Second tergite length 0.36 mm. Thyridia very short, transverse. Ovipositor thin, distinctly upcurved (Fig. 24); sheath about 1.4 mm long, almost 2.5 times length of first tergite.

Body predominantly black, metasoma behind first segment with brownish tinge. Labial palpi, mandibles (except teeth), lower half of clypeus and tegula yellow to brownish yellow. Maxillary palpi darkened. Pterostigma brown, veins light brown to brown. Legs strongly darkened to black; fore femur (except base) and tibia yellow; apex of mid and hind femora, base and apex of mid and hind tibiae yellow to yellowish brown.

Male.

Similar to female. Flagellum of antenna with 16 segments. Malar space shorter. Sternaulus sometimes indistinct. Clypeus entirely black.

Holotype: ♀ 'South Africa, W Cape, Cape of Good Hope Nat. Res., Olifantsbos, nr Skaife Centre, 34°16'S:18°23'E', '18–19.ix.1993, S. van Noort, Strandveld, on coast at sea level, Malaise Trap', 'SAM-HYM-P006188' (SAMC).

Paratypes: SOUTH AFRICA: *Western Cape*: 3♂ same data as holotype (2♂ SAMC, 1♂ ZISP).

Genus *Phradis* Förster, 1869

A moderately large, predominantly Holarctic genus. Eighteen Palaearctic and one Nearctic species have been described in this genus. The currently known Palaearctic species exceeds 37 (Khalaim in press). No Afrotropical representatives have previously been recorded. Two new species of *Phradis* from the Afrotropical region are described here for the first time.

Key to Afrotropical species of *Phradis*

1 Pterostigma brown. Flagellomeres short (Fig. 17). Hind tibia entirely unicoloured, brownish. Mesopleuron impunctate. Ovipositor sheath as long as first tergite .... **modestus** sp. n.

– Pterostigma yellow. Flagellomeres very slender (Fig. 18). Hind tibia mostly black, reddish basally and apically. Mesopleuron densely and coarsely punctate. Ovipositor sheath 1.7 times as long as first tergite .... **wolfgator** sp. n.

Phradis modestus sp. n.

Figs 17, 25

Etymology: From Latin *modestus* (modest).

Diagnosis: *P. modestus* sp. n. differs from all the Palaearctic species in having a 12-segmented female flagellum and a smooth head and mesosoma.

Description:

Female.

Body length 2.2 mm.

Head 0.53 mm wide, weakly and roundly narrowed behind eyes in dorsal view; temple shorter than eye width. Ocelli small. Antenna filiform; flagellum with 12 segments, basal segments slightly elongate, subapical segments about as long as broad (Fig. 17). Mandible punctate basally, upper tooth somewhat longer than lower tooth. Malar space much shorter than basal mandibular width. Head almost entirely smooth, partly finely and scarcely punctate. Occipital carina complete.

Mesonotum and mesopleuron predominantly smooth, sometimes partly finely granulate and finely punctate. Notaulus weak. Sternaulus situated in anterior part of mesopleuron, about half as long as mesopleuron, oblique, relatively narrow, crenulated. Propodeum granulate, sometimes almost smooth or partly irregularly rugulose; basal area twice as long as wide, about half as long as apical area; spiracle round, separated from pleural carina by 1.0–1.5 diameters of spiracle; apical area with shallow median longitudinal depression, weakly irregularly rugulose, with pair of fine longitudinal carinae.

Forewing length 1.7 mm. Pterostigma wider than length of first section of radial vein. Metacarp short, ending far short of forewing apex. Second recurrent vein interstitial, unpigmented anteriorly.

Hind femur length 0.4 mm, maximum width 0.13 mm. Hind tibia 0.51 mm long, distinctly longer than hind femur. Hind spurs short, straight or weakly curved.

First tergite length 0.46 mm. First tergite entirely smooth or partly striate laterally. Second tergite length 0.28 mm. Thyridia elongate, about 1.5 times as long as wide. Ovipositor evenly upcurved, with shallow dorsal depression near apex, without teeth (Fig. 25); sheath length 0.44 mm, as long as first tergite.

Body predominantly black, metasoma behind first segment with brownish tinge. Palpi and tegula darkened. Mandibles darkened basally and apically, and yellow-brown medially. Pterostigma and veins brown. All coxa, trochanters, fore femur in its basal half, mid and hind femora almost entirely (except for narrow light apex) strongly darkened to black; fore femur apically, and all tibia and tarsi yellow-brown, sometimes faintly darkened.

Male.

Similar to female. Flagellum of antenna with 13 or (rarely) 14 segments. Malar space shorter.

Holotype: ♀ 'South Africa, W Cape, Wolfgat Nature Reserve, 34°04'S:18°39'E', '5.ix.1995; S. van Noort; sweep, S Coast Strandveld', 'SAM-HYM-P011662' (SAMC).

Paratypes: SOUTH AFRICA: *Western Cape*: 3♀ 11♂ same data as holotype (1♀ 9♂ SAMC, 2♀ 2♂ ZISP).

Phradis wolfgator sp. n.

Figs 5, 10, 14, 18, 20, 22

Etymology: From the type locality.

Diagnosis: The new species is distinguished from all the known species of *Phradis* by the yellow pterostigma, almost entirely smooth head and mesonotum, densely punctate mesopleuron, and shape and coloration of the hind tibia (Fig. 22).

Description:

Female.

Body length 3.3 mm.

Head 0.74 mm wide, strongly and roundly narrowed behind eyes in dorsal view; temple almost as long as eye width (Fig. 14). Ocelli small. Antenna filiform; flagellum with 11 segments, very slender, basal segments broadened apically (Fig. 18). Mandible punctate basally, upper tooth longer than lower tooth. Malar space distinctly shorter than basal width of mandible. Head predominantly smooth (frons very finely granulate); upper half of clypeus, face and frons distinctly and more or less densely punctate, vertex and temple finely and sparsely punctate. Occipital carina complete.

Mesonotum mostly smooth, finely granulate and distinctly punctate anteriorly and medially. Notaulus weak. Mesopleuron strongly prominent, very coarsely and densely punctate (distances between punctures shorter than diameter of puncture), partly punctato-rugulose, finely granulate to smooth between punctures. Sternaulus situated in anterior part of mesopleuron, about half as long as mesopleuron. Dorsolateral area of propodeum smooth anteriorly, granulate to irregularly rugulose laterally and antero-posteriorly; basal furrow distinctly elongate, widened anteriorly (Fig. 5); spiracle round, separated from pleural carina by 1.5–1.8 diameters of spiracle; apical area round anteriorly, with median longitudinal depression, coarsely irregularly rugulose, its longitudinal carinae developed posteriorly and indistinct anteriorly (not reaching transverse carina).

Forewing length 2.6 mm. Pterostigma distinctly wider than length of first section of radial vein. Metacarp very short, slightly projecting beyond the radial vein (Fig. 20). Second recurrent vein interstitial, unpigmented anteriorly.

Hind femur length 0.63 mm, maximum width 0.18 mm. Hind tibia length 0.72 mm, distinctly longer than hind femur, curved apically (Fig. 22). Hind spurs relatively long, distinctly curved apically.

First tergite length 0.72 mm, posterior width 0.22 mm. First tergite smooth dorsally and partly striate laterally. Second tergite length 0.36 mm. Thyridia very short, transverse. Ovipositor slender, evenly upcurved, without teeth; its sheath 1.2 mm, about 1.7 times as long as first tergite.

Body mainly black, metasoma behind first segment with brownish tinge. Labial palpi and mandibles (except teeth) yellow-brown. Base of antenna and clypeus in its lower part brownish. Maxillary palpi darkened. Tegula strongly darkened. Pterostigma yellow, veins light brown. Legs strongly darkened (to black); femora apically, and tibiae basally and apically (fore tibia almost entirely) yellow-brown.

Male.

Similar to female. Flagellum of antenna with 13 segments; basal flagellomeres shorter. Malar space shorter than in female. Basal furrow of propodeum narrow, not widened posteriorly, bordered by carinae laterally.

Holotype: ♀ ‘South Africa, W Cape, Wolfgat Nature Reserve, 34°04'S:18°39'E’, ‘5.ix.1995; S. van Noort; sweep, S Coast Strandveld’, ‘SAM-HYM-P011664’ (SAMC).

Paratypes: SOUTH AFRICA: *Western Cape*: ♂ same data as holotype (SAMC); ♀ same locality and date, but coll. H.G. Robertson (ZISP); *Northern Cape*: ♀ Oorlogskloof farm, Wide Gate 2 site (8.24 km 158° SSE Nieuwoudtville), 31°25.970'S:19°10.224'E, wheat field on dolerite, 9.x.2000, S. van Noort (SAMC).

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